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RELATIONSHIPS AMONG INDO-AUSTRALIAN ZOSTEROPIDAE (AVES)

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During preparation of the manuscript of the Zosteropidae for Peters' Checklist of Birds of the World, I reviewed once more the relationships of the Indo-Australian white-eyes. The first attempt to arrange these species in natural groups was made by Stresemann in a pioneering work in 1931. The revisionary studies of the ensuing 25 years were summarized by G. F. Mees in a very thorough systematic review of the Indo-Australian Zosteropidae (1957, 1961). Mees' work is based not only on an exhaustive analysis of the literature, but also on an examination of most of the available museum material. His fundamental monograph will remain for many decades the basis of all taxonomic research in Indo-Australian white-eyes. In a few cases my own interpretation of relationship differs from his, resulting in a somewhat different sequence of species. This paper may serve to explain the reason why, in these few instances, I have adopted a sequence different from that chosen by Mees in his systematic review. I am deeply indebted to Dr. Mees for much valuable information on Zosteropidae.

Absolute criteria of relationship in the Zosteropidae do not exist at the present time, and neither Mees nor I can prove that the sequence adopted by one of us is "more correct" than the sequence adopted by the other. White-eyes have characteristic songs and call notes, and perhaps analysis of these and other behavioral characters may lead to a better understanding of relationships. I know of no other group of birds in which close relatives, for example the subspecies of *Zosterops atrifrons* or the semispecies of the superspecies *griseotineta*, may differ more from each other than do distantly related species. Indeed some

Oriental species are almost indistinguishable from African forms, from which they must have been isolated since remote times.

ZOSTEROPS CEYLONENSIS Holdsworth

This species is often considered closely related to *Z. palpebrosa*, and Mees (1957, p. 22) lists it immediately preceding *palpebrosa*. Yet, he states correctly, "morphologically *Z. ceylonensis* is undoubtedly rather closer to several other species than to *palpebrosa*" (*ibid.*, p. 26). For this reason I have placed it after *palpebrosa* and closer to some of the Indonesian species from which it might possibly have been derived.

ZOSTEROPS ERYTHROPLEURA Swinhoe

This species, with its rufous flanks, does not resemble any of the species (*palpebrosa* and *japonica*) with which it is usually placed. Being also the only white-eye restricted to the Palearctic region, I prefer to indicate its distinctness by placing it first in the sequence, as had been previously done by Stresemann (1931, p. 206).

ZOSTEROPS CONSPICILLATA Kittlitz

Mees (1957) lists this Micronesian bird as the last species of the genus. To me this species does not seem nearly as aberrant as *Z. cinerea*. Indeed, in spite of its paleness, a frequent character in island birds, *conspicillata* resembles in some ways the *japonica-palpebrosa* assemblage. Since several Micronesian birds were derived from the west (e.g. *Acrocephalus*), relationship of *conspicillata* with *japonica* is a distinct possibility. It is hoped that placing the species earlier in the sequence will bring it closer to its real relatives.

ZOSTEROPS WALLACEI Finsch

As Mees has stated rightly, this is an old and peculiar endemic. It seems distantly related to the western group of species (*atricapilla*, *everetti*, *nigrorum*, and others) and I have therefore placed it earlier in the sequence.

ZOSTEROPS FLAVA-CHLORIS-LUTEA group

I have adopted Mees' sequence for the sake of uniformity. I still feel, however, that these species are more closely related

to each other than believed by Mees. To separate *lutea* from *chloris* by 14 other species does not seem to be the best possible arrangement.

ZOSTEROPS CONSOBRINORUM Meyer

This species is so similar to *Z. chloris citrinella* that in any other genus one would consider them conspecific. Even though I have retained *Z. consobrinorum* as a full species, I have placed it next to *chloris*, while I now treat the very distinct peripheral forms *grayi* and *uropygialis* as full species (see also Mees, 1953, 1961).

ZOSTEROPS ATRIFRONS group

I agree, on the whole, with Mees' (1961) arrangement. However, *Z. atriceps* is best listed before the *atrifrons-minor-delicatula* series, because the latter is close to the forms on the islands east and northeast of New Guinea (*meeki*, *hypoxantha*) and should not be separated from them by *atriceps*.

In this group of species close relatives may appear rather different (belly, yellow or white; forehead, black or olive; eye-ring, absent or broad; throat, orange, yellow or whitish). The delimitation of the species is therefore a difficult task. Two of the most distinct forms, *minor* and *delicatula* of New Guinea are connected by the intermediate forms *chrysolaema* and *rothschildi*. Mees (1961) quite rightly combines *atrifrons* and *minor* in a single species, but if one goes that far one must also include *meeki* (close to *delicatula*) and *hypoxantha*.

I have maintained *Z. mysorensis* as a separate species, because in its combination of characters (no yellow on throat, heavy gray wash on breast and flanks, olive forehead, absence of eye-ring, blackish loral region, and pale yellow under tail coverts) it resembles some other species (e.g. *ugensis*) more closely than *atrifrons*.

ZOSTEROPS NATALIS Lister

Mees (1957) notwithstanding, there is much to indicate that this species is closer to one of the east Indonesian or Australian species (*chloris*, *lutea*, etc.) than to any of the Malaysian species. I agree in this with Stresemann and Chasen. Mees (1957) makes the peculiar comment that my (Mayr, 1944)

association of this species with *lutea*, instead of with *citrinella*, is an "unfortunate choice," overlooking that I include *citrinella* in *lutea* in the cited paper.

ZOSTEROPS RENDOVAE Tristram

The description of *rendovae* was based on a Rendova Island specimen misidentified as *Tephritis olivaceus* Ramsay, but newly named *rendovae* since the name *olivaceus* Ramsay (nee *Certhia olivacea* Linnaeus 1766) was considered unavailable. That the original author, Tristram, considered *rendovae* a name for the Rendova bird far more than a replacement name for *olivaceus* is evident from his subsequent statement (1894, p. 30): "I give a figure (Pl. III, fig. 2) of *Zosterops rendovae* of Rendova Island . . . which I described in the Ibis for 1882, p. 135." Galbraith (1957) has well stated the reasons for retaining the name *rendovae* for the Rendova White-Eye to which it had been applied universally from 1882-1955, including general books in ornithology and evolutionary biology.

ZOSTEROPS LATERALIS Latham

The arrangement of the Australian races is largely based on unpublished research kindly made available to me by Drs. A. Keast and G. F. Mees.

The resulting sequence of species of Indo-Australian *Zosterops* is as follows:

<i>crythropleura</i>	<i>uropygialis</i>
<i>japonica</i>	<i>anomala</i>
<i>palpebrosa</i>	<i>atriceps</i>
<i>ceylonensis</i>	<i>atrifrons</i>
<i>conspicillata</i>	<i>mysorensis</i>
<i>salvadorii</i>	<i>fuscicapilla</i>
<i>atricapilla</i>	<i>buruensis</i>
<i>everetti</i>	<i>kuchni</i>
<i>nigrorum</i>	<i>novaeguineae</i>
<i>montana</i>	<i>mcealii</i>
<i>wallacei</i>	<i>natalis</i>
<i>flava</i>	<i>lutea</i>
<i>chloris</i>	<i>griseotincta</i>
<i>consobrinorum</i>	<i>rennelliana</i>
<i>grayi</i>	<i>rellalarella</i>

<i>luteirostris</i>	<i>minuta</i>
<i>rendovae</i>	<i>xanthochroa</i>
<i>murphyi</i>	<i>lateralis</i>
<i>ugiensis</i>	<i>strenua</i>
<i>strescmanni</i>	<i>tenuirostris</i>
<i>sanctaerucis</i>	<i>albogularis</i>
<i>samoensis</i>	<i>inornata</i>
<i>explorator</i>	<i>cincerea</i>
<i>flavifrons</i>	

THE ABERRANT GENERA OF INDO-AUSTRALIA

Some white-eyes differ from the normal structure or coloration of the genus *Zosterops*, as represented by a species like *palpebrosa* or *lateralis*, to such an extent that they have been separated generically. If all the larger white-eyes, with somewhat aberrant coloration and a longer or heavier bill, could be placed in a single genus, no one would mind. The fact of the matter is, however, that 13 genera have been proposed to accommodate 18 species. Excluding *Lophozosterops* (with 6 species), there are 11 generic names for 13 species. Some further simplification is possible by combining *Sanfordia* with *Woodfordia*, as well as the Micronesian *Kubaryum*, *Megazosterops*, and *Cinnyrorhyncha* with *Rukia*. In the "Oreosterops group" of authors, Mees (1953, pp. 57-66) recognizes six genera, reduced in 1957 to five by combining *Apoia* with *Lophozosterops*. Of these five genera, three (*Madanga*, *Tephrozosterops*, and *Oculocincta*) are monotypic, while *Heleia* has two species in one superspecies. The five genera seem to form a natural group and a renewed analysis may result in further lumping, perhaps of all five genera into *Heleia*.

The sequence chosen by Mees (1953) does not seem quite natural. By starting with the species that is most like *Zosterops* and also keeping the pattern of geographic distribution in mind, we arrive at the following sequence: *Tephrozosterops* (*stalkeri*), *Madanga* (*ruficollis*), *Lophozosterops* (*pinaiae*, *goodfellowi*, *squamiceps*, *javanica*, *superciliaris*, *dohertyi*), *Oculocincta* (*squamifrons*), and *Heleia* (*muelleri*, *crassirostris*).

I entirely agree with Mees (*in litt.*) that *Hypocryptadius* Hartert does not appear to be a white-eye. Fresh material is needed to determine whether it should go to the Monarchini, Sylviinae, Timaliinae, or some other group.

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